CENTRAL VALLEY FLOOD MANAGEMENT PLANNING PROGRAM

FloodSAFE CALIFORNIA

MEMORANDUM

TO: Merritt Rice, CVFPP Project manager;
Gary Hester, CVFMP Program manager;
Ken Kirby, FloodSAFE Executive Advisor

FROM: Yung-Hsin Sun, MWH

SUBJECT: PROPOSED REVISION FOR DELINEATING THE PLANNING AREA AND REGIONAL BOUNDARIES OF THE CENTRAL VALLEY FLOOD PROTECTION PLAN

DATE: September 3, 2009

CC: Glenn McPherson, Central Valley Floodplain Evaluation and Delineation Program
Maria Lorenzo-Lee, California Building Standards Code Update Project

---

This memorandum provides recommendations on the methodology and source of data to be used in revising the planning area and regional boundaries for the Central Valley Flood Protection Plan (CVFPP).

CVFPP Planning Area

A planning area is the geographic area taken into consideration when formulating a plan. The CVFPP planning area is the Sacramento-San Joaquin Valley, which is defined in Government Code Section 65007 as the following.

> *"Sacramento-San Joaquin Valley" means any lands in the bed or along or near the banks of the Sacramento River or San Joaquin River, or any of their tributaries or connected therewith, or upon any land adjacent thereto, or within any of the overflow basins thereof, or upon any land susceptible to overflow therefrom. The Sacramento-San Joaquin Valley does not include lands lying within the Tulare Lake basin, including the Kings River.*

It is challenging to create a map representation of the above specification because of the much altered landscape in the Central Valley through historical reclamation activities and lack of distinct topographic features in relatively flat terrains near valley floors. The history of planning area delineation is summarized below:

- Since the beginning of the FloodSAFE Initiative, the Sacramento-San Joaquin Valley has been shown in presentation materials based on an approximate conventional definition of the Sacramento and San Joaquin watersheds. While the watershed of the Sacramento River is easy to define, the watershed of the San Joaquin River usually excludes the contribution of Fresno Slough into the San Joaquin River. Most of early FloodSAFE documents show the Sacramento-San Joaquin Valley consistent with this definition.

- In May 2009, a re-examination of the hydrologic boundaries in the Fresno area suggested that previous exclusion of Fresno Slough's contribution to the San Joaquin River was not consistent with the definition provided by Government Code Section 65007. Therefore, the planning area map was revised to include areas east of Fresno Slough, north of Kings River watershed that drain to Fresno Slough and then to the San Joaquin River. The watershed boundary delineation was based on information provided by San Joaquin District Office. The revised map was used in a series of five Regional Forums of the Central Valley Flood Management Planning Program (CVFMP) in June 2009. Subsequent CVFMP and other FloodSAFE documents have adopted this revised planning area map for illustrative purposes.

- In August 2009, the southern boundary of the planning area was questioned by members in the Upper San Joaquin Regional Conditions Work Group, which was established for developing draft content for the first milestone report, Regional Conditions Summary Report. The work group members requested that DWR revisit the delineations for the planning area and regional boundaries and make use of the best watershed boundary information available.

CVFPP Regional Boundaries

The CVFPP regional boundaries are merely for convenience to define the regions for establishing regional work groups to collaborate with DWR in developing draft content for the CVFPP. Work groups are an important venue used for developing the CVFPP to promote broad support of the resulting plan. Maintaining the concept of a system approach, the region delineation is a way to focus communication and information exchange via a manageable size of work groups with people knowledgeable about their region..

Five regions have been established:

- Upper Sacramento Region: Sacramento River above Freemont Weir, including Sutter Bypass

- Lower Sacramento Region: Sacramento River below Freemont Weir to the confluence of San Joaquin River near Pittsburg, and the Feather, Yuba and American river regions

- Lower San Joaquin Region: San Joaquin River below Merced River confluence to the confluence of Sacramento River near Pittsburg, and the Tuolumne, Stanislaus, and Mokelumne river regions

- Upper San Joaquin Region: San Joaquin River above Merced River confluence, and the Fresno, Chowchilla, and Bear river regions

- Sacramento-San Joaquin Delta: the Legal Delta defined in Water Code Section 12220; this region overlaps areas in Lower Sacramento and Lower San Joaquin regions

The original boundaries were based on the division of work boundaries used for the CVFED Program, and water supply demand unit area information used in the Water Plan and other DWR water supply studies.

One of the challenges in using these sources of data for CVFPP study purposes is that the water supply demand unit areas could be bordered by major water features such as a river. This type of delineation is reasonable for water supply analysis; however, the boundaries will not work well in a flood management study. More importantly, it is not conducive to regional discussions for developing watershed-based solutions. In August 2009 regional work group meetings, all work groups commented on the regional boundaries, and recommended re-examination based on watershed information.

Proposed Method for Boundary Delineation

The revision of planning area and regional boundaries should be based on watershed boundaries. More importantly, the source of information needs to be citable and conform to established standards to be credible. We propose use of the Watershed Boundary Dataset (WBD) from the National Resources Conservation Service (NRCS), the United States Department of Agriculture (USDA).

In the last decade, NRCS worked with other federal and state agencies and with the Subcommittee on Spatial Water Data of the Federal Geographic Data Committee (FGDC) to establish a federal interagency standard covering mapping and delineation of hydrologic units that would be suitable for all agencies. The resulting dataset is the WBD. The members of the subcommittee include representatives from the American Society of Civil Engineers, U.S. Bureau of Land Management, Federal Emergency Management Agency, National Oceanic and Atmospheric Administration, National Weather Service, National States Geographic Information Council, NRCS, Texas Water Development Board, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency (USEPA), U.S. Forest Service, and U.S. Geological Survey (USGS).[1]

The goals for the WBD effort are to create a nationally consistent, seamless, and hierarchical hydrologic unit dataset based on topographic and hydrologic features across the country, and to provide more detailed delineation (watershed and subwatershed) in a digital format that is consistent with other national seamless databases.[2] The georeferenced data and associated attributes were created in accordance with the established federal guidelines and standards.[3]

A hydrologic unit defines the aerial extent of surface water drainage to a point. The WBD-defined hydrologic units establish a baseline drainage boundary framework, accounting for all land and surface areas, determined solely upon science-based hydrologic principles, not favoring any administrative or special projects nor particular program or agency.[4] The basic principles of delineation include: (1)

[1] Advisory Committee on Water Information, 2009. Subcommittee on Spatial Water Data – Membership. http://acwi.gov/spatial/spatial_members.html. Last access: August 15, 2009.

[2] California Interagency Watershed Mapping Committee, 2009. Watershed Boundary Dataset (WBD), California Certification Update 2009. Fact Sheet. http://cain.ice.ucdavis.edu/calwater/factsheet/WBD-CA_FactSheet2009.pdf. Last Access: August 15, 2009.

[3] U.S. Geological Survey and U.S. Department of Agriculture, Natural Resources Conservation Service, 2009, Federal guidelines, requirements, and procedures for the national Watershed Boundary Dataset: U.S. Geological Survey Techniques and Methods 11–A3, 55 p. ftp://ftp-fc.sc.egov.usda.gov/NCGC/products/watershed/hu-standards.pdf. Last Access: August 15, 2009.

[4] California Interagency Watershed Mapping Committee, 2009. Watershed Boundary Dataset (WBD), California Certification Update 2009. Fact Sheet. http://cain.ice.ucdavis.edu/calwater/factsheet/WBD-CA_FactSheet2009.pdf. Last Access: August 15, 2009.

hydrologically based delineation; (2) crossing stream at confluence; (3) may cross at other points if other hydrologic units at same level are upstream; and (4) no delineations running down stream centerline.[5] At a minimum, the hydrologic units are delineated and georeferenced to the USGS 1:24,000 scale topographic base map meeting National Standards for Spatial Data Accuracy (NSSDA), and integrated with both the USGS National Hydrography Dataset (NHD) and the National Elevation Dataset (NED).[6]

In WBD, the hydrologic units in the nation were delineated in 6 levels: region, subregion, basin, subbasin, watershed, and subwatershed. A system of 2, 4, 6, 8, 10, and 12-digit codes are used to assign a unique identifier for each unit. Prior to the WBD, the hydrologic units were only delineated to subbasin level, which is often reported by USGS as cataloging unit. [7]

The State of California also contributed to the development of the WBD, and the information was developed as a collaboration among DWR, the California Department of Forestry and Fire Protection, the California Department of Fish and Game, the State Water Resources Control Board, the U.S. Forest Service, USGS, USEPA, NRCS, the U.S. Department of the Interior (including Bureau of Reclamation and the Bureau of Land Management).[8] The California watershed boundary data has received a full certification by NRCS for inclusion in the WBD in December 2008.[9]

The dataset is archived at the NRCS's National Cartography and Geospatial Center, and can be downloaded from the USDA Natural Resources Geospatial Data Gateway via http.//datagateway.nrcs.gov/. The data is also distributed through the California Spatial Information Library (CaSIL) via http://www.atlas.ca.gov/download.html.

Proposed Revision of Planning Area and Regional Boundaries

The WBD was developed in compliance with the established national standards; the certification process provides additional credibility of data integrity. The available subwatershed information from the WBD is beneficial to the delineation of CVFPP study boundary and regional boundaries, especially in areas with relatively flat topography.

[5] Natural Resources Conservation Service, U.S. Department of Agriculture, 2009. Watershed Boundary Dataset Facts. http://www.ncgc.nrcs.usda.gov/products/datasets/watershed/facts.html. Last Access: August 15, 2009.

[6] Laitta, M., Legleiter, K.J. and Hanson, K.M., 2004. The National Watershed Boundary Dataset. ESRI: Hydro Line. Summer. http://www.esri.com/library/newsletters/hydroline/hydroline_summer2004.pdf. Last Access: August 15, 2009.

[7] California Interagency Watershed Mapping Committee, 2009. Watershed Boundary Dataset (WBD), California Certification Update 2009. Fact Sheet. http://cain.ice.ucdavis.edu/calwater/factsheet/WBD-CA_FactSheet2009.pdf. Last Access: August 15, 2009.

[8] California Interagency Watershed Mapping Committee, 2009. Memorandum of Understanding Regarding the Use and Maintenance of the California Watershed Map. http://cain.ice.ucdavis.edu/calwater/calmou.html. Last Access: August 15, 2009.

[9] California Interagency Watershed Mapping Committee, 2009. Watershed Boundary Dataset (WBD), California Certification Update 2009. Fact Sheet. http://cain.ice.ucdavis.edu/calwater/factsheet/WBD-CA_FactSheet2009.pdf. Last Access: August 15, 2009.

Based on the WBD, the planning area (Sacramento-San Joaquin Valley) and associated regional boundaries were redefined. That is, subwatersheds were grouped together and merged by watersheds defined in the work group boundary descriptions. Several changes included in this delineation:

- The southern boundary of the planning area is defined by the boundaries of subwatersheds that drain into Fresno Slough, then to San Joaquin River. The WBD allows a more refined delineation of this boundary. A similar concept was used to include the subwatersheds on the west side of the valley.

- The entire Merced River basin is included in the Upper San Joaquin Region.

- The boundaries of the Upper Sacramento Region were redefined at northeast and southwest corners to better conform to the watershed delineation.

- The entire Cache Creek Basin is included in the Lower Sacramento Region.

- The only deviation from the NRCS data occurs at the western extreme of the Delta Region, which is shared by Lower Sacramento and Lower San Joaquin Regions. The watershed delineation would leave a small area of the Legal Delta out of the planning area and work group regions. The Delta is a critical area for the CVFPP and other Delta-centered programs, and projects often used the Legal Delta as the boundary. To avoid unnecessary confusion, we included the entire Legal Delta in the planning area and Delta Region. The inclusion of the western extreme of the Delta Region does not imply extension of CVFPP planning area into the Suisun Marsh area.

The attached figure shows the comparison of the delineation before and after the proposed changes. With these changes, the delineation of planning area and regions are based on certified watershed information endorsed by federal and state agencies and users on a national level.

Upper Sacramento River

Lower Sacramento River

Lower San Joaquin River

Delta

Upper San Joaquin River

Proposed Boundary

Current Boundary

Redding

Red Bluff

Chico

Oroville

Colusa

Yuba City

Fremont Weir

Woodland

Sacramento

Walnut Grove

Fairfield

Pittsburg

Stockton

Manteca

Modesto

Vernalis

San Francisco

Merced

LosBanos

Firebaugh

Mendota

Fresno

Visalia

5

80

50

99

Proposed CVFPP Regional Work Group Boundary

Proposed Boundary

Current Boundary

Note:
NRCS subwatersheds labeled by last three digits of their full twelve-digit IDs due to space considerations. As a result, in some cases neighboring subsheds may inappropriately share ID's

N

0 15 30 Miles

Map Created: August 13, 2009

G:\SPFFP_MXDs\CVFPP_RegionalWorkGroup\CVFPP_RegionalWorkGroup.mxd